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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/072,613	02/05/2002	Densen Cao	5061.8 P	9973

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EXAMINER	
LEWIS, RALPH A	

ART UNIT	PAPER NUMBER
3732	

DATE MAILED: 03/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/072,613	CAO, DENSEN	
	Examiner	Art Unit	
	Ralph A. Lewis	3732	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 December 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Rejections based on Prior Art

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-8 and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mills et al (WO 99/16136) in view of Kennedy et al (US 5,634,711) and Ostler et al (US 6,008,264)

Mills et al disclose a dental curing light Figure 5 comprised of a wand 47, power supply 52, electronic circuitry 54, light emitting semi conductor chip(s) 43, primary heat sink 48, secondary heat sink 45, 51. The light emitting elements may be operated in a pulsed mode (page 16, 4th paragraph). While Mills et al disclose the pulsed operation of the light emitting diodes, they fail to disclose the specifically claimed "square wave pattern" for the LED driving current. Kennedy et al, however, teaches the use of square wave forms (107a and 107b) for driving the LED array of a similar dental curing light. The use of the pulses permits higher out put levels without generating excess heat and more efficient power consumption (column 5, lines 25-30). To have used a square wave pattern for producing the pulsed operational mode the Mills et al device as taught by Kennedy et al in order to have high efficiency and lower heat output would have

been obvious to one of ordinary skill in the art in view of the teaching by Kennedy et al. Additionally, attention is drawn to Ostler et al who teach that square pulses provide for enhanced curing of dental material (note column 16, lines 35-51). To have made the Mills et al pulses square as taught by Ostler et al in order to improve the curing of dental material would have been obvious to one of ordinary skill in the art.

In response to the present rejection applicant added the limitation that the light emitted from the semiconductor chip "travels directly away from the curing light at an angle." The examiner notes that the light guide 41 of Mills et al has an angled tip so that light emitted from the semiconductors and traveling from "the curing light" does so at an angle to the longitudinal axis of "the curing light." Applicant indicates that the limitation was allowed in his earlier patent 6,783,362, however, the examiner notes that the claims of the earlier patent (unlike the present) require an elongated heat sink with the semiconductor mounted in a fixed position with regard to the heat sink. The patented claims further require that the light emitted from the semiconductor be emitted from the semiconductor itself at an angle to the elongated heat sink, rather than referring to the light that is emitted from the "curing light."

Claims 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mills et al (WO 99/16136) in view of Kennedy et al (US 5,634,711) and Ostler et al (US 6,008,264) as applied above in claim 1, and in further view of Doiron et al (5,698,866).

In Mills the LEDs are mounted directly on a flat heat sink 48. Doiron et al, however, teach that an improvement over mounting diodes on a flat surface (Figures 9 and 10) is mounting them in a well (Figures 11 and 12) formed on the heat sink so that more light from the LEDs is reflected forward in the desired direction. To have mounted the Mills LEDs in wells as taught by Doiron et al so that more light is reflected forward in the desired direction would have been obvious to one of ordinary skill in the art.

Claims 5-8 and14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kennedy et al (US 5,634,711) in view of Kennedy (US 5,420,768).

Kennedy et al disclose a wand 10 adapted to be grasped having a heat sink 26 with a longitudinal axis, semi conductor chip 22 mounted on the heat sink and electronic control circuitry for providing square wave forms (107a and 107b) for driving the LED array of a similar dental curing light. The use of the pulses permits higher output levels without generating excess heat and more efficient power consumption (column 5, lines 25-30). Kennedy et al, while illustrating a partial light guide 38, fails to explicitly disclose that the light traveling away from the "curing light" does so at an angle. In an earlier patent, Kennedy '768 does however, teach that the light guide 17 be formed at an angle to the longitudinal axis of the wand. To have angled the light guide 38 of Kennedy at al at an angle within the broad range claimed as taught in the earlier Kennedy patent '768 so

that the user could more easily direct the light to the desired location would have been obvious to one of ordinary skill in the art.

Claims 1-8 and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kovac et al (US 6,200,134) in view of Kennedy et al (US 5,634,711).

In Figure 6 Kovac et al disclose a wand 76 with longitudinal axis, power supply 78, electronic control circuitry and LED's 43 mounted on a substrate. The Figure 6, embodiment doesn't illustrate the presence of a heat sink, however, the earlier embodiment Figure 4 discloses a heat sink for conveying heat from the LED's and to improve the efficiency of the LEDs. To have added a heat sink to the substrate on which the LED's 43 are mounted in the Figure 6 embodiment in order to draw heat from the LED's and improve the efficiency of the LEDs would have been obvious to one of ordinary skill in the art. In regard to the pulsed current limitation, Kennedy et al teaches the use of square wave forms (107a and 107b) for driving the LED array of a similar dental curing light. The use of the pulses permits higher out put levels without generating excess heat and more efficient power consumption (column 5, lines 25-30). To have used a square wave pattern for producing the pulsed operational mode the Kovac et al Figure 7 device as taught by Kennedy et al in order to have high efficiency and lower heat output would have been obvious to one of ordinary skill in the art in view of the teaching by Kennedy et al.

Allowable Subject Matter

The independent claims 1, 5, 9 and 14 of the present application would be allowable if amended to further include the concepts of (1) an elongated heat sink having a longitudinal axis and (2) that the semiconductor chip(s) is mounted with respect to the elongated heat sink so that "light emitted directly forward from the semiconductor chip is emitted from the semiconductor chip at an angle of from about 45 degrees to about 135 degrees to the elongated heat sink longitudinal axis." The "light emitted directly forward from the semiconductor chip" limitation is intended to overcome the situation where incidental light is emitted from sides of the semiconductor (i.e. claims refer to "forward from the semiconductor chip") and to overcome the situation where the light is later reflected or conducted by a light transport device (e.g. fiber optic) at an angle (i.e. "light emitted directly forward from"). The rejections based on Kennedy et al and Kovac et al were added to help illustrate the criticality of the elongated heat sink limitation.

Action Made Final

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry concerning this communication should be directed to **Ralph Lewis** at telephone number **(571) 272-4712.** Fax (703) 872-9306. The examiner works a compressed work schedule and is unavailable every other Friday. The examiner's supervisor, Kevin Shaver, can be reached at (571) 272-4720.

Ralph A. Lewis
Primary Examiner
Au 3732

R.Lewis
March 14, 2005